

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:

a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,

a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil,

wherein the supporting means comprises a plurality of flat springs, and

wherein the flat springs function as signal lines for supplying signals to the focusing coil and the tracking coils.

2. Canceled

3. Canceled

4. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:

a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,

a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil

[The optical head according to Claim 1], wherein the pair of magnets are disposed plane-symmetrically to the Z-Y plane including the Z axis aligned with the optical axis of the objective lens and the Y axis and the Z-X plane including the Z axis aligned with the optical axis of the objective lens and the X axis.

5. (Original) The optical head according to Claim 1, wherein the magnetic circuit comprises yokes corresponding to the respective magnets and back yokes disposed inside the focusing coil on both ends of the objective lens in the Y axis direction so that the back yokes are parallel with the Z axis.

6. (Original) The optical head according to Claim 1, wherein the magnetic circuit comprises yokes corresponding to the respective magnets and back yokes disposed inside the focusing coil on both ends of the objective lens in the X axis direction so that the back yokes are parallel with the Z axis.

7. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:
a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,
a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil
[The optical head according to Claim 1], wherein the objective lens comprises a liquid crystal element for compensating for an aberration of the objective lens.

8. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:

a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,

a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil [The optical head according to Claim 1], wherein circuit boards having a circuit element for driving the focusing coil and the tracking coils are disposed on both sides of the coil bobbin in the X axis direction parallel to the Z-Y plane including the Z axis aligned with the optical axis of the objective lens and the Y axis and/or both sides of the coil bobbin in the Y axis direction parallel to the Z-X plane including the Z axis aligned with the optical axis of the objective lens and the X axis.

9. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:

a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,

a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil
[The optical head according to Claim 1], wherein the objective lens comprises a liquid crystal element for compensating for the aberration of the objective lens, and a circuit board having at least one of the circuit elements for driving the focusing coil, the tracking coils, or the liquid crystal element is disposed on both sides of the coil bobbin in the X axis direction parallel to the Z-Y plane including the Z axis aligned with the optical axis of the objective lens and the Y axis and/or both sides of the coil bobbin in the Y axis direction parallel to the Z-X plane including the Z axis aligned with the optical axis of the objective lens and the X axis.

10. (Currently Amended) An optical head having a two-axis actuator driving an objective lens in a focusing direction along a Z axis orthogonal to the surface of an optical disk and in a tracking direction along an X axis in the radial direction of the optical disk, comprising:

a coil bobbin for supporting the objective lens, the optical axis of the objective lens being aligned with the Z axis,

a focusing coil wound around the Z axis and disposed on the coil bobbin,

a pair of tracking coils wound around the X axis and disposed on both ends of the coil bobbin in the X axis direction,

supporting means for supporting the coil bobbin so that the coil bobbin is movable in the focusing direction and the tracking direction,

two pairs of magnets disposed so that magnets in each pair are disposed opposingly on both ends of the corresponding tracking coils in the Y axis direction which is orthogonal to both the Z axis and the X axis, the surfaces of the magnets opposing the tracking coils are magnetized in the Y axis direction and have the same polarity,

a magnetic circuit forming a closed magnetic path in which magnetic lines generated by each pair of magnets sandwiching the focusing coil intersect the tracking coils and the focusing coil
[The optical head according to Claim 1], wherein the supporting means comprises a plurality of flat springs, the objective lens comprises a liquid crystal element for compensating for the aberration of the objective lens, a circuit board having at least a circuit element for driving the liquid crystal among the circuit elements for driving the focusing coil, the tracking coils, or the liquid crystal element is disposed on both sides of the coil bobbin in the X axis direction parallel to the Z-Y plane including the Z axis aligned with the optical axis of the objective lens and the Y axis and/or both sides of the coil bobbin in the Y axis direction parallel to the Z-X plane including the Z axis aligned

with the optical axis of the objective lens and the X axis, and the flat springs function as signal lines for supplying signals to the circuit boards for driving.

11. (New) The optical head according to Claim 4, wherein the magnetic circuit comprises yokes corresponding to the respective magnets and back yokes disposed inside the focusing coil on both ends of the objective lens in the Y axis direction so that the back yokes are parallel with the Z axis.

12. (New) The optical head according to Claim 4, wherein the magnetic circuit comprises yokes corresponding to the respective magnets and back yokes disposed inside the focusing coil on both ends of the objective lens in the X axis direction so that the back yokes are parallel with the Z axis.